

Translation of German Published, Non-Examined Patent Application  
DE OS 28 10 999, filed under No. 28 10 999.1 on 03/14/78, and  
published on 09/21/78, claiming the priority of British Patent  
Application 11470-77; Title: Dishwasher Detergent; Applicant:  
Unilever N.V.; Representative: Dr. F. Lederer; Inventor: Wolfgang  
PROX

CLAIMS

1. A copolymer-free, aqueous, liquid dishwasher detergent containing an alkali metal hydroxide, an alkali metal polyphosphate and an organic sequestration agent, characterized in that it contains between 5 and 25 weight-% of KOH, between 5 and 30 weight-% of an alkali metal tripolyphosphate and, as the sequestration agent, between 0.5 to 10 weight-% of an amino polycarboxylic acid of a possibly substituted amino polyphosphonic acid, or of an alkyl polyphosphonic acid, or their alkali metal salts.

2. The detergent in accordance with claim 1, characterized in that it contains between 10 to 20 weight-% of potassium tripolyphosphate.

3. The detergent in accordance with claim 1 or 2, characterized in that as the sequestration agent it contains between 1 and 7 weight-% of ethylene diamino tetraacetic acid.

DISHWASHER DETERGENT

The present invention relates to a liquid dishwasher detergent suitable for use in hard as well as soft water.

Liquid dishwasher detergents of various compositions have been known for a long time. In connection with industrial dishwashing in particular, mostly highly alkaline products are employed, which contain alkali, polyphosphates, silicates and the like. Although on the average such products have a comparatively good cleaning effect, they often display clear disadvantages in connection with defined soilage, such as tea and coffee stains, because an accumulation of such staining cannot be prevented after repeated cleaning operations. Up to now the co-application of a chlorine bleaching agent, such as hypochlorite, has been considered as a requirement for removing these stains; however, the co-application of such chlorine bleaching agents requires special packaging for the liquid dishwasher detergents; furthermore a problem can arise if it is intended to co-use additional, less chlorine-stable ingredients, such as (co)polymers.

It was therefore the object of the invention to create a liquid dishwasher detergent which does not contain any chlorine bleaching agents and still provides satisfactory removal of tea and coffee stains.

This object was attained in that it was found that the addition of organic sequestering agents to an aqueous composition,

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ORIGINAL INSPECTED

which, besides alkali hydroxide, contains inorganic structural salts, considerably improved the removal of tea and coffee stains and considerably reduced the accumulation of these stains.

Although liquid dishwasher detergents containing an alkali hydroxide, inorganic structural salts and organic sequestering agents are known per se (see US patents 3,607,764, 3,899,436, 3,591,508 and German Published, Non-Examined Patent Application DT-OS 18 06 206), these compositions in accordance with this prior art are intended to contain further components, such as chlorine bleaching agents, copolymers, defined solvents, or quite specific sequestering agents, such as hydroxycarboxylic acids or pyrophosphates.

The invention now relates to a copolymer-free, aqueous, liquid dishwasher detergent containing an alkali metal hydroxide, an alkali metal polyphosphate and an organic sequestration agent, which is characterized in that it contains between 5 and 25 weight-% of KOH, between 5 and 30 weight-% of an alkali metal tripolyphosphate and, as the sequestration agent, between 0.5 to 10 weight-% of an amino polycarboxylic acid of a possibly substituted amino polyphosphonic acid, or of an alkyl polyphosphonic acid, or their alkali metal salts.

The alkali metal tripolyphosphate preferably is potassium tripolyphosphate which, however can be wholly or partially replaced by sodium tripolyphosphate. The amount of the alkali metal tripolyphosphate fluctuates between 5 and 30 weight-%, preferably between 10 and 20 weight-%.

In a lye in which the product content can be controlled by means of metering, the amounts are better expressed in g/l: 0.05 to 2.5 g/l KOH, 0.05 to 3.0 g/l alkali metal tripolyphosphate, preferably 0.1 to 2.0 g/l, and 0.005 to 1 g/l, preferably 0.01 to 0.07 g/l of an amino polycarboxylic acid, or of a possibly substituted amino polyphosphonic acid or alkyl polyphosphonic acid or their alkali metal salts.

The organic sequestering agents which can be employed in accordance with the invention are, for example, nitrilotriacetic acid, ethylene diamino tetraacetic acid, ethylene diamino tetramethylene phosphonic acid, ethane-1-hydroxy-1,1-diphosphonic acid, or their alkali metal salts. These sequestering agents can be used by themselves or in a mixture thereof, for example a mixture of ethane-1-hydroxy-1,1-diphosphonic acid and ethylene diamino tetraacetic acid. The organic sequestering agent is employed in an amount of 0.5 to 10, preferably 1 to 7 weight-%.

The liquid dishwasher detergent can of course contain further standard additives, for example tensides, corrosion inhibitors, dyes, hydrotropic agents, etc. Bleaching agents can possibly also be used; however, it is preferred not to use bleaching agents.

The dishwasher detergents in accordance with the invention can be used for industrial cleaning as well as for use in the home, they are suitable for use in soft water and in hard water.

The invention will be further explained by means of the following examples.

Example I:

Several batches in accordance with the invention were produced from an aqueous basic composition containing 10 weight-% KOH and 15 weight-% potassium tripolyphosphate by means of the addition of different organic sequestering agents.

These sequestering agents were

Nitrilotriacetic acid	1%, 3%, 7.5%
Ethylene diamino tetramethylene phosphonic acid	1%
Ethylene diamino tetraacetic acid,	1% and 3%
Ethane-1-hydroxy-1,1-diphosphonic acid + ethylene diamino tetraacetic acid	1% + 0.5%

During dishwashing tests in soft and hard water (18° DH) in a commercially available dishwasher, wherein normally occurring soiled dishes were washed daily, either together with cups intentionally stained with tea, or without them, it was shown that these batches considerably reduce the accumulation of tea [stains], but while using the basic composition a tea [stain] buildup occurred quickly.

Example II:

Cups, which were stained with tea and lipstick, were cleaned in an industrial dishwasher of the Stierlen-3-Tank type in the normal program with the following products.

The china cups were stained as follows:

Tea: 2.5 l tap water (approximately 23°dH) were heated to boiling, after which 50 g tea were added and steeped for 15 min. The solution was then distributed through a sieve to ten cups, and the filled cups were let stand at room temperature overnight for 16 h. The cups were emptied prior to the start of washing.

Lipstick: A line of approximately 0.5 cm width and approximately 5 cm length was applied with a customary lipstick to the upper outer rims of ten cups.

The stained cups were washed in the machine and evaluated. The described treatment was repeated thereafter without manual cleaning over a period of ten days.

The evaluation of the tea/lipstick removal was performed visually in accordance with a number code from 0 to 3, wherein  
(% removal : approximate values)

0 : Everything removed	100%
1 : Almost everything removed	80 - 100%
2 : Moderately removed	40 - 80%
3 : Hardly anything removed	0 - 40%

The following products were used for cleaning:

A: 10.0% KOH

15.5% Potassium triphosphate

74.5% Water

(A was used as the reference product)

B: 10.0% KOH

15.5% Potassium triphosphate

1.0% Ethylene diamino tetraacetic acid

73.5% Water

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C: 10.0% KOH

15.5% Potassium triphosphate

1.0% Ethane-1-hydroxy-1,1-diphosphonic acid

73.5% Water

The amounts of these products were 2.5 g of the product per liter. The water used was passed through an ion exchanger. The following results were obtained:

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Evaluation Results

		1st Day			3rd Day			7th Day			10th Day		
		A	B	C	A	B	C	A	B	C	A	B	C
Cup 1	T+	0	0	0	1	0	0	2	0	0	2	0	0
	L+	0	0	0	0	0	0	0	0	0	1	0	0
Cup 2	T	0	0	0	2	0	0	2	0	0	2	0	0
	L	0	0	0	0	0	0	1	0	0	1	0	0
Cup 3	T	2	0	0	1	0	0	2	0	0	2	0	0
	L	0	0	0	0	0	0	1	0	0	1	1	0
Cup 4	T	0	0	0	1	0	0	2	0	0	2	0	0
	L	0	0	0	0	0	0	0	1	0	2	1	0
Cup 5	T	0	0	0	3	0	0	3	0	0	3	0	0
	L	0	0	0	0	0	0	2	0	0	2	0	0
Cup 6	T	0	0	0	1	0	0	2	0	0	2	0	0
	L	0	0	0	0	0	0	0	0	0	0	0	0
Cup 7	T	0	0	0	1	0	0	2	0	0	3	0	0
	L	0	0	0	0	0	0	1	0	0	1	0	0
Cup 8	T	1	0	0	2	0	0	2	0	0	2	0	0
	L	0	0	0	0	0	0	0	0	0	0	0	0
Cup 9	T	0	0	0	3	0	0	3	0	0	3	0	0
	L	0	0	0	0	0	0	1	0	0	1	0	0
Cup 10	T	0	0	0	1	0	0	3	0	0	3	0	0
	L	0	0	0	0	0	0	0	0	0	0	0	0

T+ = Tea

L+ = Lipstick

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This shows that with the comparison product A, a strong accumulation of tea occurred already after the third staining. After seven treatments a moderate to strong accumulation could be found in all cups. However, with products B and C in accordance with the invention the complete removal of tea could be observed even after ten treatments.

With lipstick stains an improvement could also be noted, although this staining did not show itself to be quite as critical a test staining.

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